SIMULATION AND ANALYSIS OF PARACHUTE SOFT-LANDING RETRACTION DYNAMICS

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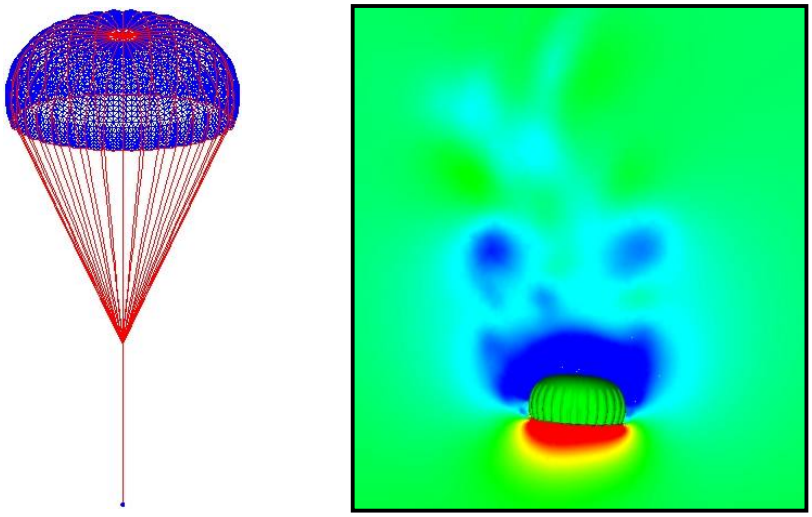
The development of parachute retraction soft landing systems is of current interest to the U.S. Army. In these systems, a control-line or muscle is attached between the payload and suspension lines to provide a rapid contraction at landing, reducing ground impact velocities to acceptable levels. A clear understanding of parachute system dynamics during soft landing is necessary to determine optimal retraction rates and activations.

Fluid-structure interactions play an important role in the behavior of parachute retraction soft landing systems, but also present a number of modeling challenges. These challenges are being addressed in the simulation of airdrop systems behavior in order to make computational modeling a valuable tool for a broad range of airdrop applications. We present our methods for simulation of parachute fluid-structure interaction behavior and demonstrate the capabilities of the method with results from a series of retraction soft landing application simulations. These simulations focus on, for a range of retraction rates, the aerodynamic and structural performance of an Army T-10 parachute during soft landing. Result from the fluid-structure interaction simulation are presented and compared with existing experimental data.



Parachute Soft Landing Retraction System: Structural Model (left);
Computed Pressure Field at One Instant During Soft Landing Simulation.